

# Earth Science Enterprise's Improved

## MODIS Features:

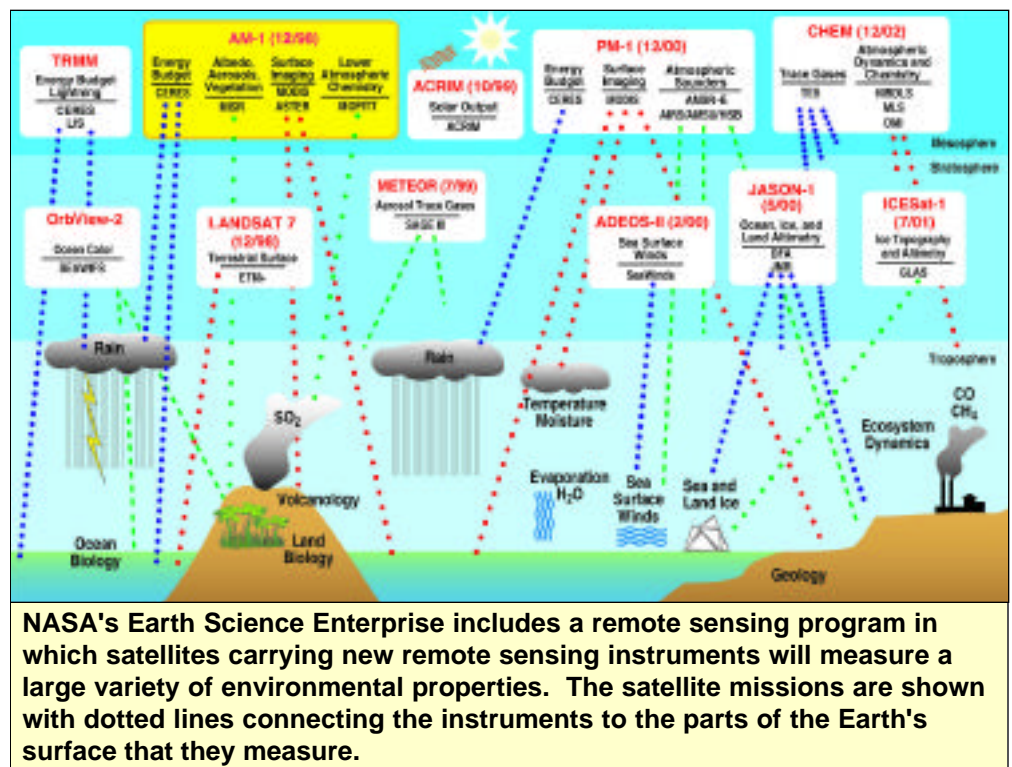
- Atmospheric measurements of a variety of biological and physical processes over land and ocean every 1 to 2 days
- 36-band medium resolution, multi-spectral cross-track scanning radiometer and 2330 km wide ground swath
- A variety of valuable land products

## Landsat 7 Features:

- A new panchromatic band with 15 m spatial resolution
- A new 375 Gb (100 scene) onboard solid state recorder
- Improved downlink rate from 85 Mbps to 150 Mbps

**T**he next generation of ESE encompasses several satellite missions and instruments. Each instrument has unique characteristics that allow it to produce different types of raw data which will be used to generate measurements of oceanic, land surface, and atmospheric parameters. Three instruments have great potential value for all industries studied: MODIS, Landsat 7, and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER). These instruments are multispectral imagers, which measure electromagnetic radiation in the visible, near-infrared and thermal-infrared parts of the spectrum.

MODIS, one of the most advanced satellite remote sensing instruments built to date, is a moderate resolution multispectral imager designed to measure biological and physical processes globally. The ground swath and resolution provide images of every point on Earth in a 48 hour cycle. MODIS will collect information on surface temperature, concentration of chlorophyll, vegetative conditions -- including leaf area index, cloud cover and cloud properties, and fire occurrence, size, and temperature.



MODIS will gather data frequently, measure radiation in 36 spectral bands -- the largest range ever, be "on" all of the time, and have long-term calibration stability. In comparison, the remote sensing instruments that are currently used, such as NOAA's Advanced Very High Resolution Radiometer (AVHRR), measure only 5 spectral bands with a near global daily coverage cycle.

# Remote Sensing Data

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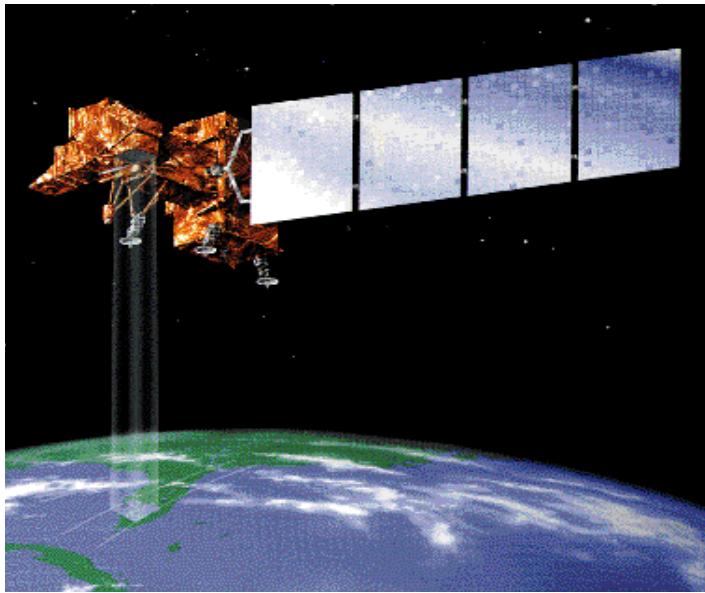
In contrast to MODIS, both Landsat 7 and ASTER are high-resolution multispectral imagers. Data from these instruments will generally resemble the high-resolution data already available from Landsats 4 and 5, France's SPOT, and India's IRS-1 satellites.

In addition to MODIS and ASTER, the Multi-Angle Imaging Spectroradiometer (MISR) will gather significant information related to vegetation, land cover type, and soils. MISR will have indirect application for fisheries because it will be used to calibrate the MODIS ocean color estimates.

The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) instrument launched in August 1997 on the OrbView-2 platform is contributing large volumes of data to the ESE program based on NASA's purchase of the data from the commercial sponsor, Orbital Sciences Corporation. The SeaWiFS ocean color sensor is providing fast, repeated global coverage of marine phytoplankton, ocean surface currents, and global climate change. Its primary application is commercial and sports fishing, fisheries management, and coastal zone management by state, county, and regional planners and managers.

The instruments aboard the Tropical Rainfall Measuring Mission (TRMM), launched in November 1997, obtain daily global estimates of tropical and subtropical rainfall. TRMM includes the first rain radar in the ESE constellation of satellites. TRMM gathers data from the tropics and subtropics (33 degrees north latitude to 35 degrees south latitude). The primary TRMM applications are for the agriculture, forestry, insurance, and disaster management industries for the southern most part of the U.S.

The sophisticated general circulation models produced by NASA's Data Assimilation Office provide a comprehensive set of coarse resolution global climate data valuable for both operational and predictive applications. These data will be used in predictive climate models.



## ASTER Features:

- High-resolution images of land surface, water, ice, and clouds
- 14 bands from visible through the thermal infrared and 60 km wide ground swath
- 10 EOS standard products

## MISR Features:

- Top-to-atmosphere, cloud, and surface angular spectral reflectance functions
- 9 individual cameras to observe the Earth at 9 discrete view angles
- Land surface products, including radiance, reflectance, albedo, angular reflectance properties, and precision atmosphere correction